SPECIFICATION

TITLE OF THE INVENTION

LOCALIZATION METHOD

FIELD OF TECHNOLOGY

[0001] This application relates to a localization method used in connection with emergency calls in mobile communications systems.

BACKGROUND

[0002] The demand for security is rapidly growing and thus advanced technology in communications, safety, and security systems is mandatory in order to maintain, track and respond to alarm signals. A wide variety of emergency call systems have been used, including direct connected, i.e. hard wired systems, wireless systems, and telephone systems.

[0003] If an emergency call is made, localization of the communication device and its respective user is desirable. Under current communications systems, various methods for determining a position are known, such as using the cell identification (cell ID), or localization methods within a cell, such as E-OTD (Enhanced Observed Time Difference).

[0004] However, to make use of emergency call systems using localization methods, it is necessary to be connected to the respective cellular network. In other words, no emergency call can be made if no network is available.

BRIEF SUMMARY

[0005] Based on the text blow, a method, apparatus and a system is disclosed for safely making an emergency call, regardless of the respective cellular network connection.

[0006] The present disclosure is based on the idea of selecting one network out of a plurality of possibly available networks, and sending an emergency signal over the selected network. According to an exemplary embodiment, one of these communications networks may be an emergency location transmitter (ELT) network, such as an airborne or other safety network. According to another exemplary embodiment, one of the communication networks may be a cellular,

e.g. a mobile phone, network. Such a safety network may exist independently from any cellular communications network.

[0007] Upon activating an emergency call routine at a communication device, a module for broadcasting over the safety network can be enabled, if a cellular network is not available.

[0008] The broadcast would preferably transmit to all stations in the range of the communication device.

[0009] In cases where a cellular network is available, an emergency call procedure is performed by using the cellular network. Additional services, e.g. a more accurate localization, can be requested optionally from a suitable instance of the safety network, e.g. a safety control centre.

[0010] In cases where no cellular network is available, an emergency call procedure is performed by using a safety network.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The various objects, advantages and novel features of the present disclosure will be more readily apprehended from the following Detailed Description when read in conjunction with the enclosed drawings, in which

[0012] Figure 1 is an exemplary embodiment of an apparatus aligned to make emergency calls by pushing only one button;

[0013] Figure 2 illustrates a schematic block diagram concerning the relations between user, network providers and safety control centers in the case of public sponsorship of the emergency number; and

[0014] Figure 3 illustrates a diagram for private and public sponsorship.

DETAILED DESCRIPTION

[0015] Reference is now made to Figure 1. In this embodiment, the underlying idea is that help can be reached by just pushing a single button (1) in a communication device , e.g. a mobile phone or cell phone or any other mobile communication device. It is understood that the communication device is not limited only to cell phones, but to any other kind of mobile equipment allowing to establish a connection to a cellular communications network.

[0016] The button 1 initiates an emergency call routine, by which an emergency call is performed using a network that is determined by the routine. Accordingly, a world-wide safety system would be available by using a cell phone, even if there is no cellular communications network such as GSM (Global System for Mobile Communications) available. This concept complies with the risen safety awareness anywhere in the world. Wide availability can be achieved by using cell phones or generally mobile equipment which are low cost widespread communication devices.

[0017] In the exemplary embodiment, the cellular (communications) network refers to any network such as GSM (Global System for Mobile Communications), TDMA/CDMA (Time Division Multiple Access / Code Division Multiple Access) based networks, UMTS (Universal Telecommunications System), WLAN (Wireless Local Area Network)-Systems.

[0018] The concept makes use of an emergency or global safety network, e.g. an airborne network comprising satellites and/or aircraft. This will be described below in detail:

[0019] Typical safety networks may exist independently from any cellular network and include airborne objects and/or satellites and/or radio beacons. As beacons that can be operated as a transponder and/or a transmitter can be mobile, they are referred to as a network with mobile transmitter stations or an emergency network in the framework of the application. The mobile beacons can be implemented from places such as a aircraft or on a vessel.

[0020] By law, all civil and military aircraft carry an emergency location transmitter (ELT) on board. The ELT begins transmitting when it is activated by the gravitational forces caused by an aircraft crash. When another aircraft or satellite receives an emergency signal, it transfers information about the crash location to the respective air search and rescue centers. Generally, the aircrafts and satellites are able to receive signals from emergency radio beacons and relay them to ground stations, which, in turn, process the signal to determine where the beacon is located. The ground stations then relay this information to search and rescue authorities. The system typically has four parts: emergency radio beacons, which

call for help; aircrafts and satellites to receive said calls; ground stations, which get the message; and control centers, which sound the alarm.

[0021] The emergency radio beacon has two functions: first, if somebody is in distress in a remote area, he/she can make an emergency call. Secondly, by doing so, information is also provided about his/her location. There are three kinds of radio beacons, classified by who uses them. Aircrafts normally have an emergency location transmitter (ELT). At sea, the vessel should have an emergency position indicating radio beacon (EPIRB). Personal location beacons (PLB) are for land activities such as hiking or camping in the wilderness. The radio beacons can transmit signals on certain emergency frequencies normally located in (but not limited to) the VHF (Very High Frequency) region between a hundred and a few hundred MHz. Every signal of a beacon can be detected by airborne objects or satellites or can be repeated by another beacon, e.g. carried by aircraft passing by, which is then functioning as a transponder.

[0022] In other words, since the emergency network is available for communication, identification and localization, the proven ELT (Emergency Location Transmitter) technology principle may be used. By identification of a communication device or its respective user, the identification can be based on the telephone number, the IMEI (International Mobile Equipment Identity), or other means.

[0023] In the context of the application by airborne network, not only a network provided by the satellites is covered, but also a network based upon the satellites in combination with transponders or transmitters placed in aircrafts or vessels.

[0024] An ELT activator suitable for a communication device may include a detector susceptible to gravitational forces, smoke, pressure, temperature or various other environmental parameters. Apart from environmental parameters, the ELT activator may also detect certain personal parameters, by which conclusions about the person's health state can be made.

[0025] An exemplary routine for performing location will be described:

[0026] 1. A security button 1, shown in Figure 1 is pushed. This activates an emergency call routine. The emergency routine comprises the following steps, which are partially optional:

[0027] 2. In case the mobile is switched off it may activate the mobile device. When the mobile is switched on, a module for broadcasting over the emergency network, that may operate on frequencies distinct from those of the cellular communication network, is activated. This activation can be done optionally regardless of the possibility to establish a connection to a cellular communication network. By activating the module for broadcasting, an immediate enabling can be achieved or the starting of a countdown period may be activated after which the module is enabled. The module may also be referred to as an ELT module, and the respective activator as ELT activator. The ELT module is off during normal operation in order to reduce power consumption.

[0028] 3. Upon activation a distinction is made whether a connection to a cellular communications network is available or not:

[0029] a) A cellular communications network is available: In case there is available communication to a cellular network, the activating of the emergency call routine initiates a speech connection, which is established via the cellular communications network to a safety control center. A further identification and localization of the caller is done via the speech connection (descriptions of the user) or automatic methods of the cellular network, such as using the cell identifier or E-OTD. Additionally, a predefined routine may be started for providing additional optimal help, i.e. e.g. using localization methods of the emergency network.

[0030] b) No cellular communications network is available: Without available connection to a cellular communications network, an emergency procedure via the emergency network, e.g., a ELT distress signal is automatically activated. The safety cell phone then broadcasts an ELT signal. This signal will be received by an emergency network, e.g. an airborne network, and it is attempted to connect to a safety control center or the receiving station will inform the safety control center and/or rescue and help services.

[0031] 4. In both cases, the transmitter of the emergency signal or the user of the communication device can be located accurately via radio and/or cellular communications network bearing. The safety control center will take further actions in the field of emergency or distress phases. Safety control center will then coordinate other service suppliers, e.g. an automobile association a fire brigade.

[0032] In sum, the choice exists to locate distressed persons via a cellular network, e.g. GSM, and/or ELT signals from a cell phone. Furthermore, a voice connection can be established via GSM if a GSM network any other cellular network is available. A safety control centre (SCC) is foreseen to coordinate optimal help.

[0033] A preferred embodiment of an apparatus allowing above described procedures of making an emergency call comprises typically a safety or security button 1, which by being pushed activates the emergency call routine. Furthermore, it comprises an ELT module which allows to transmit and/or transpond emergency signals. It also comprises optionally an ELT activator, that activates the ELT module, as already described above. It may further comprise an additional power supply for the ELT module. For aeroplanes, as already described, the ELT activator reacts somehow on gravitational forces. In the framework of the invention, however, the ELT activator can be also realized differently, which will be explained below. An additional power supply allows longer operation of the ELT module. An automatic communication set-up helps during the establishment of a speech connection. A programmable automatic log-on mode allows accessing the emergency call routine even if the user is not in position to do so manually. Preferably, the body of the communication device is shock resistant. Also, an emergency amplification of the GSM signal can be implemented.

[0034] Next, another exemplary embodiment of the above-mentioned emergency routine will be described in further details. As previously discussed, by pushing the safety button 1 an emergency routine is started within the cell phone. Accordingly, an ELT activity countdown is started within the cell phone, regardless of any network connection. After the ELT activity countdown the ELT module is

enabled, a differentiation is made between a situation where a cellular communications network is contacted and a situation where a cellular communications network cannot be contacted. In case a contact to a cellular communications network can be established, pushing the safety button 1 means, that the safety control center (SCC) is being rung by the cell phone. The caller can report a distress and provide further details if he is able to and it is possible. The safety control center tries to identify the caller, the nature of the problem and may retrieve possible medical data of the caller, if the caller is in position to speak. Furthermore, the safety control center tries to determine geographical coordinates, e.g. via voice and/or cellular communication network data. Within a cellular network, various methods for locating may be used, such as the above-mentioned E-OTD method. As the spatial resolution of localization methods within a cellular communications network is limited, it is decided by the safety control center, whether ELT search is necessary to achieve an enhanced localization. Having made this decision, the safety control center transmits an ELT activation or deactivation code to the cell phone.

[0035] In the case without any cellular communications network contact, an automatic activation of the ELT distress signal, is performed. Upon this distress signal emergency procedures are being organized by the SCC, such as giving alarm to the police, the fire brigade, ambulance, air rescue, etc. Furthermore, the safety control center submits location data to search and rescue forces with a link to the activated ELT signal or by supporting then without ELT guidance. An emergency assistance operator may confirm the completion of an operation to the safety control center.

[0036] In a further embodiment, the safety cell phone can be activated remotely in order to search for missing persons, children or cars. To prevent unwanted use of this method this mode of remote activation should be enabled by the user of the cell phone. Also, an automatic check or a safety centre search signal in predetermined time interval may also be used, even if the power of the cell phone is switched off.

[0037] The various embodiments of the invention exhibit major advantages for a safety cell phone concept. The ELT modules, which are to be integrated, are used in air or vessel traffic. They can broadcast ELT signals in predefined emergency frequencies. The technology within the cell phone is adapted and an integration of the safety feature in a standard cell phone housing is possible.

[0038] The above-mentioned safety control centre may offer a 24 hour service around the year, voice communication in most common languages of the respective area, a direct interface to emergency operators and cellular network providers, and the access to personal or health data of any cell phone owner. The safety control centre may be a public or private body, which is to be financed accordingly.

[0039] In Figure 2 a schematic drawing between users, network providers (carriers) and safety instances are shown: the end user will purchase a cell phone with contract by a supplier 7. The end user 2 may access air traffic control (ELT) 4 via his/her ELT module. Furthermore, the end user 2 can reach emergency instances 5 such as police, fire department, etc. via an emergency number, e.g. 911. The end user 2 can have a normal cellular communications network connection provided by the carrier 2 of the respective cellular communications network. The carrier 2 provides data about localization run by e.g. EOTD to the security instance 5 such as police or the fire brigade, etc. This information transfer is mainly limited by legislation. The security instance 5, which may be part of the safety control centre 6, have an agreement with the air traffic control 4 , thus they can also access the far more exact ELT localization data.

[0040] In Figure 3 an extension of this diagram is shown, where the safety control center 6 is sponsored by private and public sectors. The end user 2 himself may purchase a cell phone by a cell phone supplier 7 and have a contract with a cellular network provider, a carrier 3. Additionally, the end user 2 can have a certain safety contract with a safety service supplier 8, e.g. SOS, emergency assistance, an automobile association or an armed response. This safety service supplier 8 may be affiliated in some way to the service control center 6 and be in contact with the security instance 5, e.g. police or fire brigade, or also special users

and customers such as an automobile association. The safety control center 6 has again a connection to the air traffic control 4 and the network provider 3. The air traffic control 4 may be regulated by the administration of a respective area.

[0041] The above described description and drawings are only to be considered illustrative of exemplary embodiments, which achieve the features and advantages of the invention. Modifications and substitutions to specific process conditions and structures can be made without departing from the spirit and scope of the invention. Accordingly, the invention is not be considered as being limited by the foregoing description and drawings, but is only limited by the scope of the appended claims.